

CLAIMS

1. An exhaust gas recirculation device for an internal combustion engine, comprising a recirculation gas control valve for controlling a recirculation flow rate in an exhaust gas recirculation passage of said internal combustion engine, and an intake air control valve for controlling a flow rate in an intake passage of said internal combustion engine, said exhaust gas recirculation device further comprising:

an intake air flow sensor for detecting a flow rate in said intake passage,

a recirculation flow sensor for detecting an exhaust-gas recirculation flow rate in said exhaust gas recirculation passage, and

control means for performing feedback control of said intake air control valve and/or said recirculation gas control valve so that an exhaust gas recirculation ratio obtained based on outputs of said intake air flow sensor and said recirculation flow sensor is a target recirculation ratio.

2. The exhaust gas recirculation device for the internal combustion engine according to Claim 1,

wherein when a target value of the recirculation ratio is abruptly changed, said control means performs feedback control of one of said intake air control valve and said recirculation gas control valve which has a faster response.

3. The exhaust gas recirculation device for the internal combustion engine according to Claim 1,

further comprising a plurality of three-dimensional map each defined in combination of an opening of the recirculation gas control valve, an opening of said intake air control valve, and the recirculation ratio,

wherein said control means selects one of said three-dimensional maps corresponding to an operating state of said internal combustion engine, and controls said intake air control valve and/or said recirculation gas control valve so that the exhaust gas recirculation ratio obtained based on the outputs of said intake air flow sensor and said recirculation flow sensor is the target recirculation ratio.

4. The exhaust gas recirculation device for the internal combustion engine according to Claim 2,

wherein when the target value of the recirculation ratio is abruptly changed, said control means controls one of said intake air control valve and said recirculation gas control valve which has a faster response.

5. The exhaust gas recirculation device for the internal combustion engine according to Claim 1,

wherein said exhaust-gas recirculation flow sensor is a sensor for detecting the recirculation flow rate based on a pressure difference between at least two or more points in said exhaust gas recirculation passage, or a sensor for

detecting a mass flow rate in said exhaust gas recirculation passage, and

said intake air flow sensor is a sensor for detecting the intake air flow rate based on a pressure difference between at least two or more points in said intake passage, or a sensor for detecting a mass flow rate in said intake passage.

6. The exhaust gas recirculation device for the internal combustion engine according to Claim 1,

wherein said intake air control valve is an electronically controlled type throttle actuator.